Remarks/Arguments

Applicants have received and carefully reviewed the Final Office Action of the Examiner mailed September 24, 2007. Currently, claims 29-34, 36-37, 39-56, and 58-60 remain pending. Claims 29-34, 36-37, 39-56, and 58-60 have been rejected. Favorable consideration of the following remarks is respectfully requested.

Claim Rejections Under 35 USC § 102

In paragraph 6 of the Final Office Action, the Examiner rejected claims 29, 30, 33, 34, and 36-48 under 35 USC §102(b) as being anticipated by *Pratt* et al. (U.S. Patent No. 6,127, 058). After careful review, Applicants must respectfully disagree. Turning first to claim 29, which recites:

> 29. (Previously Presented) A method of forming a fuel cell, comprising the steps of:
>
> forming a first aperture defined by a first aperture surface through a first electrode layer;
>
> forming a second aperture defined by a second aperture surface through a second electrode layer;
>
> providing a proton exchange membrane;
>
> providing an adhesive between the first electrode layer and the proton exchange membrane and between the second electrode layer and the proton exchange membrane;
>
> providing a conductive layer on the first electrode layer and/or a conductive layer on the second electrode layer, wherein the conductive layer on the first electrode layer covers at least part of the first aperture surface; and
>
> sandwiching the proton exchange membrane and the adhesive between the first electrode layer and the second electrode layer, where the first aperture of the first electrode layer is at least partially aligned with the second aperture of the second electrode layer, thereby exposing the proton exchange membrane.

(Emphasis Added). *Pratt* et al. clearly do not disclose such a method. For example, claim 29 recites a first aperture defined by a first aperture surface through a first electrode layer, and a second aperture defined by a second aperture surface through a second electrode layer. Claim 29 further recites that the conductive layer on the first electrode layer covers at least part of the first aperture surface. This is illustrated in, for example, Figure 4A-4C of the present specification. Figure 4C is reproduced below for the Examiner's convenience:

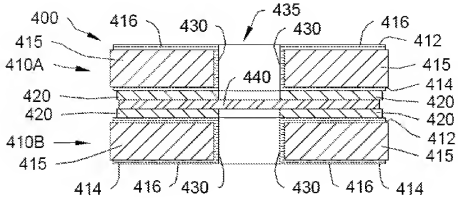

Fig.4C

The present specification states:

> In the illustrative embodiment, an aperture 435 is pre-formed through the electrode 410 thickness T_4. The aperture 435 can be formed using conventional methods such as, for example, punching, etching, or laser cutting. The aperture 435 is defined by an aperture surface 430 surrounding the aperture 435. The aperture 435 can be any useful size or shape. In an illustrative embodiment, the aperture 435 is rectangular, square, or round and has a cross-sectional surface area of less than 1 mm^2.

(Emphasis Added)(Specification, page 11, lines 17-22). As can be seen, and in the illustrative embodiment, the aperture surface 430 is the surface that defines the aperture 435 in the vertical direction of Figure 4C, and through the electrode layer 410A. With respect to Figure 4A, the present specification states:

> In the illustrative embodiment of FIG. 4A, the substrate 415 is coated with a conductive material 416 on at least a portion of, or the entire aperture surface 430. In addition, the conductive material can be disposed on at least a portion of the top surface 412 and/or at least a portion of the bottom surface 414. In some embodiments, the conductive material may be patterned on the top surface 412 and/or the bottom surface 414. The conductive material 116 on the aperture surface 430 may provide a seal that helps prevent the fuel from escaping from the aperture 435, particularly if the substrate 415 is somewhat porous to the fuel source. In an illustrative embodiment, the conductive material 116 can have any useful thickness, such as, for example, a thickness of up to 1000 Angstroms. The conductive material 116 can be a conductive metal or conductive polymer, for example.

(Emphasis Added)(Specification, page 18, lines 1-11). Nothing in *Pratt* et al. would appear to teach, disclose or suggest providing a conductive layer on the first electrode

layer and/or a conductive layer on the second electrode layer, wherein the conductive layer on the first electrode layer covers at least part of the first aperture surface, as recited in claim 29.

The current collector assemblies of *Pratt* et al., which according to the Examiner are equated with the electrode layers of claim 29, consist of a plastic film 44 with metal current collectors 45 disposed thereon (see, for example, *Pratt* et al., column 5, lines 15-16 and Figure 4). While the plastic film 44 of *Pratt* et al. does appear to have holes for the passage of fuel and oxidant to the MEA layer, *Pratt* et al. do not teach, disclose, or suggest providing a conductive layer on at least part of the aperture surfaces defining the holes in the plastic film 44. Instead, the metal current collectors 45 appear to be provided as a separate layer on top the plastic film 44 (see, for example, *Pratt* et al., Figure 4).

The Examiner cites to the embodiment of Fig. 4 of *Pratt* et al. as incidentally disclosing apertures, in the sense of gaps, between adjacent metal current collectors 45 on an insulating substrate which together form a current collection assembly, said gaps or apertures being present if one assumes, as did the Examiner, that the electrodes were at some unspecified earlier time all on one sheet and then (were) cut apart to form individual electrodes still residing on the insulating substrate. These apertures or gaps, formed, for example, by removing metal by etching (col. 5, lines 21-23), between metal current collectors 45 of *Pratt* et al. clearly are not equivalent to the apertures recited in claim 29. Claim 29 recites that "the first aperture of the first electrode layer is at least partially aligned with the second aperture of the second electrode layer, thereby exposing the proton exchange membrane". The so-called "gaps" between adjacent metal current collectors 45 clearly do not "expose the proton exchange membrane", particularly since the plastic film 44 does not include any holes that would allow for the passage of fuel and oxidant to the MEA layer in that region.

Moreover, claim 29 recites the step of providing an adhesive between the first electrode layer and the proton exchange membrane and between the second electrode layer and the proton exchange membrane. The Examiner cited to column 5, lines 9-13 of *Pratt* et al. as teaching this step. Column 5, lines 9-13 of *Pratt* et al. states:

> Obviously, the laminated structure comprising the MEA disposed between the two current collector assemblies must be held together. This can be accomplished by ultrasonic welding or by use of adhesives at the

interfaces.

(Emphasis Added). It cannot readily be argue that this teaches the specific method step of providing an adhesive between the first electrode layer and the proton exchange membrane and between the second electrode layer and the proton exchange membrane, as recited in claim 29. This passage of *Pratt* et al. is at best ambiguous as to what "interface" the adhesive is to be used, and thus is clearly insufficient to support an anticipation rejection of claim 29.

Moreover, reading *Pratt* et al. as a whole, it would seem clear that the "interfaces" referenced in the above-cited passage of *Pratt* et al. would likely correspond to the interface that is "beyond the perimeter of the MEA" (see, for example, *Pratt* et al., column 2, lines 43-46), where such interface may "seal to prevent leaking of fuel of oxidant gasses" (see, for example, *Pratt* et al., column 2, lines 49-51). This is further supported by the disclosed alternative method of ultrasonic welding, which would seem difficult to accomplish within the perimeter of the MEA. As such, *Pratt* et al. clearly do not teach, disclose or suggest "providing an adhesive between the first electrode layer and the proton exchange membrane and between the second electrode layer and the proton exchange membrane", as recited in claim 29.

As the Examiner is well aware, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Additionally, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). (MPEP § 2131). In view of the foregoing, *Pratt* et al. clearly does not teach each and every element in as complete detail as is contained in claim 29.

In paragraph 3 of the Final Office Action, and under the heading Claim Interpretation, the Examiner asserts that the article, an assembled fuel cell, "having the structural requirements of the method claims would inherently have been formed by "providing" those components, a fuel cell having the structure required by the method claims is interpreted to having (sic) been formed by that method." Applicants respectfully disagree.

Attention is drawn to the fact, well known in many industries, that similar articles may be manufactured by distinct processes. For example, in the semiconductor fabrication industry, patterned conductor and insulator features of a layer may be created by either additive (providing) processes or subtractive (removing) processes and this difference among the methods and their variants has long been recognized as patentably distinct. Accordingly, although the claims in question "provide" elements and/or "form" the specified elements, another process for manufacturing related fuel cells could be accomplished by providing *different* materials having different relationships, "removing", "adding" portions or elements and/or "rearranging" others, such as by folding and/or cutting. In any event, the fuel cells of the cited references have different features and so may reasonably be presumed to have been made by different methods, absent indications to the contrary. The pending method claims are not inherently anticipated by the existence of a fuel cell having different structural features. Rejections based upon a presumption that articles having similar uses but distinct structural features are inherently manufactured by the same method are improper and should be withdrawn.

In addition, and specifically with respect to claim 29, *Pratt* et al. clearly does not disclose many of the recited method steps. For example, and as detailed above, *Pratt* et al. do not appear to teach, disclose or suggest the steps of: providing an adhesive between the first electrode layer and the proton exchange membrane and between the second electrode layer and the proton exchange membrane; providing a conductive layer on the first electrode layer and/or a conductive layer on the second electrode layer, wherein the conductive layer on the first electrode layer covers at least part of the first aperture surface; or sandwiching the proton exchange membrane and the adhesive between the first electrode layer and the second electrode layer, where the first aperture of the first electrode layer is at least partially aligned with the second aperture of the second electrode layer, thereby exposing the proton exchange membrane. For the foregoing reasons, as well as other reasons, claim 29 is clearly not anticipated by *Pratt* et al., nor rendered obvious by *Pratt* et al. For similar and other reasons, dependent claims 30, 33, 34, and 36-37, 39-46 are also believed to be clearly not anticipated by *Pratt* et al., nor rendered obvious by *Pratt* et al.

Turning now specifically to claim 47, which recites:

47. (Previously Presented) A fuel cell comprising:
a first electrode comprising:
a first electrode top surface;
a first electrode bottom surface;
a first electrode thickness defined by a first distance between the first electrode top surface and the first electrode bottom surface;
a first electrode aperture through the first electrode thickness defined by a first electrode aperture surface;
a second electrode comprising:
a second electrode top surface;
a second electrode bottom surface;
a second electrode thickness defined by a second distance between the second electrode top surface and the second electrode bottom surface;
a second electrode aperture through the second electrode thickness defined by a second electrode aperture surface;
a first conductive layer disposed on at least a portion of the first electrode top surface, at least a portion of the first electrode bottom surface, and at least a portion of the first electrode aperture surface;
a second conductive layer disposed on at least a portion of the second electrode top surface, at least a portion of the second electrode bottom surface, and at least a portion of the second electrode aperture surface;
a proton exchange membrane in electrical contact with and disposed between the first conductive layer and the second conductive layer;
wherein, the first electrode aperture is at least partially aligned with the second electrode aperture.

(Emphasis added). As can be seen, claim 47 recites: a first electrode aperture through the first electrode thickness defined by a first electrode aperture surface; a second electrode aperture through the second electrode thickness defined by a second electrode aperture surface; a first conductive layer disposed on at least a portion of the first electrode top surface, at least a portion of the first electrode bottom surface, and at least a portion of the first electrode aperture surface; and a second conductive layer disposed on at least a portion of the second electrode top surface, at least a portion of the second electrode bottom surface, and at least a portion of the second electrode aperture surface. Thus, for the same reasons discussed above with respect to claim 29, as well as other reasons, claim 47 is clearly not anticipated by *Pratt* et al., nor rendered obvious by *Pratt* et al. For similar as well as other reasons, dependent claim 48 is also believed to be clearly not anticipated by *Pratt* et al., nor rendered obvious by *Pratt* et al.

Claim Rejections Under 35 USC § 103

In paragraph 8 of the Final Office Action, the Examiner rejected claims 54-56 and 58-60 under 35 U.S.C. 103(a) as being unpatentable over *Pratt* et al. After careful review, Applicants must respectfully disagree. Claim 54 recites:

> 54. (Previously Presented) A method of forming a plurality of fuel cells, comprising the steps of:
>
> providing a first length of material having a first plurality apertures and a first plurality of electrical contacts, wherein the first plurality of electrical contacts include one or more conductive feed-through contacts that extend through the first length of material;
>
> providing a second length of material having a second plurality apertures and a second plurality of electrical contacts;
>
> providing a proton exchange membrane;
>
> providing an adhesive layer between the proton exchange membrane and the first length of material, between the proton exchange membrane and the second length of material, or between the proton exchange membrane and the first and second length of material; and
>
> sandwiching the proton exchange membrane and the adhesive between the first length of material and the second length of material, where the first plurality of apertures are at least partially in registration with the second plurality of apertures, and wherein at least part of the proton exchange membrane is aligned with the plurality of first and second apertures to form a plurality of fuel cells.

(Emphasis Added). For the same reasons discussed above with respect to claim 29, *Pratt* et al. do not appear to teach, disclose or suggest many of the elements of claim 54 including, for example, providing an adhesive layer between the proton exchange membrane and the first length of material, between the proton exchange membrane and the second length of material, or between the proton exchange membrane and the first and second length of material.

In addition, the Examiner has directly acknowledged that *Pratt* et al. "fail to teach that a conductive feed-through the first material (sic).", a recited element of claim 54, and states that *Pratt* et al. "do teach the first material (44 and 45 in Figure 4) and electrical contacts (46), but the contacts are only on one side of the non-conduction (sic) portion of the current collector." Despite this, the Examiner concludes that it would have been obvious to "extend the contacts (46) through the non-conduction portion (44), if the electrical connection was required by the device in which the cell was being used to be arranged on a surface on the outside of the fuel cell."

Applicants respectfully assert that a person of ordinary skill in the art would not modify the current collector assemblies of *Pratt* et al. by extending the contacts (46) through the non-conducting portion (44) if the electrical connection was required by the device in which the cell was being used to be arranged on a surface on the outside of the fuel cell, as suggested without support and in hindsight by the Examiner. Extending the contacts through the non-conduction (sic) portion (44) of the current collector assembly would render the current collection assemblies of *Pratt* et al. unsatisfactory for its intended purpose (See MPEP § 2143.01 Part V.). If the electrical contacts (46) of *Pratt* are positioned on the outer surfaces of the first and second current collection assemblies of *Pratt* et al., as suggested by the Examiner, then they would not be available, by virtue of at least the two interposed layers of non-conductive film 44, for connection with the respective second and first current collectors of adjacent cells as contemplated by *Pratt* and as illustrated by the arrangement of extended electrical contacts (46) in Fig. 4 and confirmed by the connections illustrated in Figs. 3 and 5.

Note also that connections to the cathode and anode of the series wired fuel cells of *Pratt* et al. illustrated in Figs. 3 and 5 are already outside the fuel cell, and given the similar arrangement of contacts this would be the case in Fig. 4 as well. There is simply no reason or motivation to provide outside contacts to the fuel cell of *Pratt* et al., absent the teachings in the present specification. As such, Applicants respectfully assert that claim 54 is not obvious in view of *Pratt* et al.

The Examiner also asserted that rearrangement of elements involves only routine skill. Applicants respectfully assert that the addition of elements not present in the *Pratt* et al. reference, not suggested by the *Pratt* et al. reference, and having no purpose in the *Pratt* et al. reference involves more than routine skill. Also, "[t]o establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). (MPEP § 2143.03) (Emphasis Added). As discussed previously, nowhere do *Pratt* et al. appear to teach many of the elements recited in claim 54. As such, claim 54 is believed to be clearly patentable over *Pratt* et al. For similar and other reasons, dependent claims 55-56 and 58-60 which depend from independent claim 54 and include significant additional elements, are also believed to be clearly patentable over *Pratt* et al.

In paragraph 9 of the Final Office Action, the Examiner rejected claims 31 and 32 under 35 U.S.C. 103(a) as being unpatentable over *Pratt* et al. (U.S. Patent No. 6,127,058) in view of *Stanley* et al. (U.S. Pre-grant Publication 2004/0053100). In paragraph 10 of the Final Office Action, the Examiner rejected claims 49-53 under 35 U.S.C. 103(a) as being unpatentable over *Pratt* et al. (U.S. Patent No. 6,127,058) in view *Badding* et al. (U.S. Pre-grant Publication 2002/0102450) respectively. As discussed above, *Pratt* fails to teach, disclose or suggest the recited elements of independent claims 29 and 47. Neither *Stanley* nor *Badding*, alone or in combination with *Pratt* et al., provide what is missing from *Pratt* et al. Thus, for at least these reasons, as well as other reasons, dependent claims 31 and 32 and 49-53 are also believed to be in condition for allowance.

In view of the foregoing, all pending claims are believed to be in a condition for allowance. Reexamination and reconsideration are respectfully requested. Issuance of a Notice of Allowance in due course is anticipated. If a telephone conference might be of assistance, please contact the undersigned attorney at (612) 359-9348.

Respectfully submitted,

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Brian N. Tufte, Reg. No. 38,638
CROMPTON, SEAGER & TUFTE, LLC
1221 Nicollet Avenue, Suite 800
Minneapolis, MN 55403-2402
Telephone: (612) 677-9050
Facsimile: (612) 359-9349